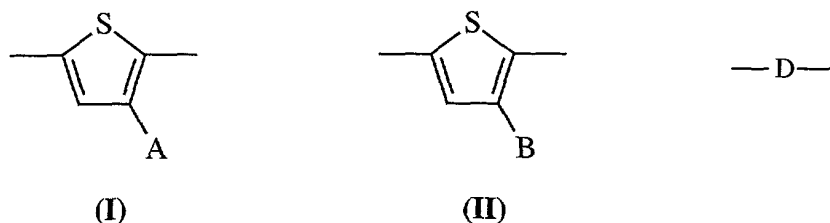


**WHAT IS CLAIMED IS:**

1. An electronic device containing a polythiophene derived from a monomer segment or monomer segments containing two 2,5-thienylene segments, (I) and (II), and an optional divalent linkage D



wherein A is a side chain; B is hydrogen or a side chain; and D is a divalent linkage, and wherein the number of A-substituted thienylene units (I) in the monomer segments is from about 1 to about 10, the number of B-substituted thienylene units (II) is from 0 to about 5, and the number of divalent linkages D is 0 or 1.

2. An electronic device in accordance with **claim 1** wherein A is alkyl containing from about 5 carbon atoms to about 25 carbon atoms; B is alkyl containing from about 0 to about 4 carbon atoms; and D is an arylene or a dioxyarene, each containing from about 6 to about 40 carbon atoms, or an alkylene or a dioxyalkane, each containing from about 1 to about 20 carbon atoms.

3. An electronic device in accordance with **claim 1** wherein A is alkyl containing from about 6 to about 15 carbon atoms; B is hydrogen; and D is arylene containing from about 6 to about 24 carbon atoms.

4. An electronic device in accordance with **claim 1** wherein D is phenylene, tolylene, xylylene, biphenylene, substituted biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene, dibenzothiophenediyl, dibenzofurandiyl, carbazolediyl, methylene, polymethylene, dialkylmethylene, dioxyalkane, dioxyarene, or oligoethylene oxide.

5. An electronic device in accordance with **claim 1** wherein A is hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentadecyl; B is hydrogen; and D is phenylene, tolylene, xylylene, biphenylene, substituted biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene, dibenzothiophenediyl, dibenzofurandiyl, carbazolediyl, methylene, polymethylene, dialkylmethylene, dioxyalkane, dioxyarene, or oligoethylene oxide.

6. A thin film transistor device comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode and a drain electrode, and a semiconductor layer comprised of the polythiophene of **claim 1**.

7. A thin film transistor device in accordance with **claim 6** wherein A is alkyl containing from about 5 carbon atoms to about 25 carbon atoms; B is hydrogen or a short chain alkyl; and D, when present, is arylene or dioxyarene, each containing from about 6 to about 40 carbon atoms, or alkylene or dioxyalkane, each containing from about 1 to about 20 carbon atoms, and wherein said source electrode and said gate dielectric layer are in contact with said semiconductive layer.

8. A thin film transistor device in accordance with **claim 6** wherein A is alkyl containing from about 6 to about 15 carbon atoms; B is hydrogen; and D is arylene containing from about 6 to about 30 carbon atoms, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

9. A thin film transistor device in accordance with **claim 6** wherein D is phenylene, tolylene, xylylene, biphenylene, substituted biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene, dibenzothiophenediyl, dibenzofurandiyl, carbazolediyl, methylene, polymethylene, dialkylmethylene, dioxyalkane, dioxyarene, or oligoethylene oxide, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

10. A thin film transistor device in accordance with **claim 6** wherein A is hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentadecyl; B is hydrogen; and D is phenylene, tolylene, xylylene, biphenylene, substituted biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene, dibenzothiophenediyl, dibenzofurandiyl, carbazolediyl, methylene, polymethylene, dialkylmethylene, dioxyalkane, or dioxyarene, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

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11. A thin film transistor device in accordance with **claim 6** wherein said substrate is a plastic sheet of a polyester, a polycarbonate, or a polyimide, said gate, source, and drain electrodes are each independently comprised of gold, nickel, aluminum, platinum, indium titanium oxide, a conductive polymer, a conductive ink or paste comprising a dispersion of conductive particles in a dispersing medium, and said gate dielectric layer is comprised of silicon nitride, silicon oxide, insulating polymers of a polyester, a polycarbonate, a polyacrylate, a poly(methacrylate), a poly(vinyl phenol), a polystyrene, a polyimide, an epoxy resin, an inorganic-organic composite material of nanosized metal oxide particles dispersed in a polymer, a polyimide, or an epoxy resin; and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

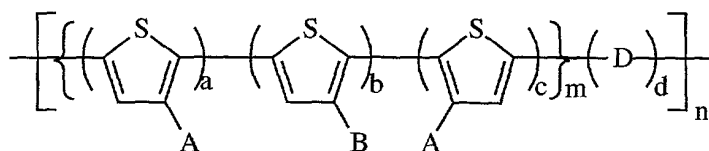
12. A thin film transistor device in accordance with **claim 6** wherein said substrate is glass or a plastic sheet; said gate, source and drain electrodes are each independently comprised of gold; said gate dielectric layer is comprised of an organic polymer of poly(methacrylate), polyacrylate, poly(vinyl phenol), polystyrene, polyimide, polycarbonate, or a polyester, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

13. A thin film transistor device in accordance with **claim 6** wherein said polythiophene layer is formed by a solution process of spin coating, stamp printing, screen printing, or jet printing, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

14. A thin film transistor device in accordance with **claim 6** wherein said gate, source and drain electrodes, dielectric, and semiconductor layers are formed from components deposited by solution processes of spin-coating, solution casting, stamp printing, screen printing, and jet printing, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

15. A thin film transistor device in accordance with **claim 6** wherein the substrate is a plastic sheet of a polyester or a polycarbonate, and the gate, source and drain electrodes are comprised of conductive polymers of polystyrene sulfonate-doped poly(3,4-ethylenedioxythiophene) or a conductive ink or paste of a colloidal dispersion of a metal of silver or gold in a binder, and the gate dielectric layer is an organic polymer or an inorganic oxide particle-polymer composite, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

16. A thin film transistor device comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode and a drain electrode, and in contact with the source/drain electrodes and the gate dielectric layer, a semiconductor layer comprised of a polythiophene represented by Formula (III)



(III)

wherein A is a long side chain; B is hydrogen or a short side chain; and D is a divalent segment; a and c represent the number of A-substituted thienylenes; b is the number of B-substituted thienylene units and is from 0 to about 6; d is 0 or 1; and n is the degree of polymerization or the number of the monomer segments in the polythiophene.

17. A thin film transistor device in accordance with **claim 1** wherein D is a divalent linkage optionally comprised of a saturated moiety of alkylene, -O-R-O-, -S-R-S-, -NH-R-NH-, where R is alkylene or arylene, or an unsaturated moiety of an arylene or heteroaromatics.

18. A thin film transistor device in accordance with **claim 17** wherein A is alkyl containing from 6 to about 25 carbon atoms; B is hydrogen or alkyl containing from 1 to about 3 carbon atoms; D is arylene or dioxyarene, each containing from about 6 to about 40 carbon atoms, or alkylene or dioxyalkane, each containing from about 1 to about 20 carbon atoms.

19. A thin film transistor device in accordance with **claim 17** wherein A is alkyl containing from about 8 to about 12 carbon atoms, and B is a hydrogen atom.

20. A thin film transistor device in accordance with **claim 17** wherein A is alkyl containing from 5 to about 15 carbon atoms; B is a hydrogen atom; D is arylene; a, b, c, and m are independently selected from the numbers 1, 2, and 3; and d = 1.

21. A thin film transistor device in accordance with **claim 17** wherein A is alkyl containing from about 8 to about 12 carbon atoms; B is a hydrogen atom; D is arylene; a = c = m = 1; b = 2; and d = 1.

22. A thin film transistor device in accordance with **claim 17** wherein n is from about 5 to about 5,000.

23. A thin film transistor device in accordance with **claim 17** wherein the number average molecular weight ( $M_n$ ) of (III) is from about 2,000 to about 100,000, and wherein the weight average molecular weight ( $M_w$ ) is from about 4,000 to about 500,000, each as measured by gel permeation chromatography using polystyrene standards.

24. A thin film transistor device in accordance with **claim 17** wherein the number average molecular weight ( $M_n$ ) of (III) is from about 10,000 to about 30,000 and the weight average molecular weight ( $M_w$ ) is from about 15,000 to about 100,000.

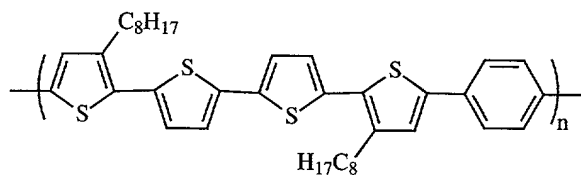
25. A thin film transistor device in accordance with **claim 17** wherein A is hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentyldecyl.

26. A thin film transistor device in accordance with **claim 17** wherein D is an arylene selected from the group consisting of phenylene, tolylene, xylylene, biphenylene, substituted biphenylene, fluorenylene, phenanthrenylene, dihydrophenanthrenylene, and dibenzofuranediyl, dibenzothiophenediyl, carbazole-diyl.

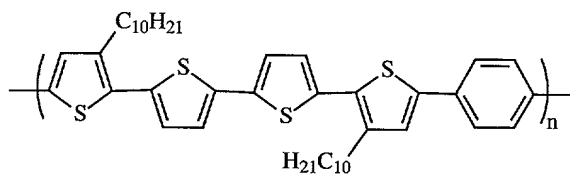
27. A thin film transistor device in accordance with **claim 17** wherein D is saturated linkage selected from the group consisting of alkylene, dioxyalkane, dioxyarene, and oligoethylene oxide.



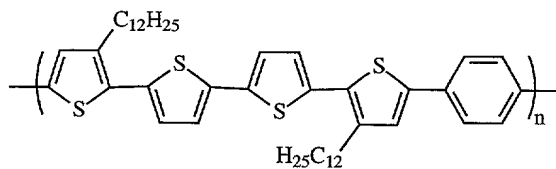
28. A thin film transistor device in accordance with **claim 16** wherein said polythiophene (III) is selected from (1) through (17) wherein n represents the number of repeating segments



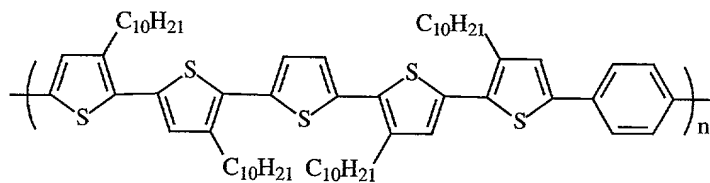
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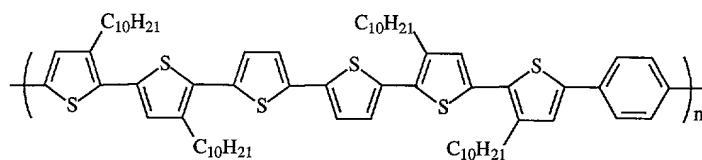
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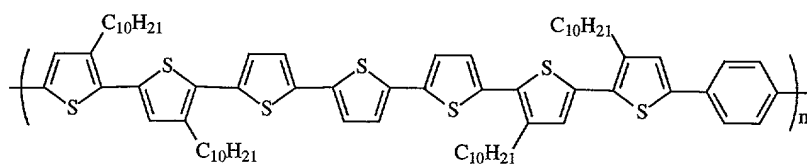
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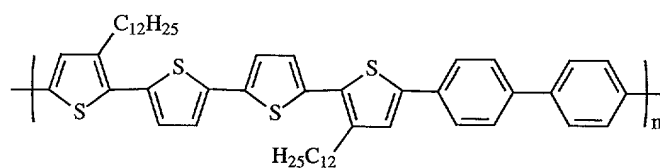
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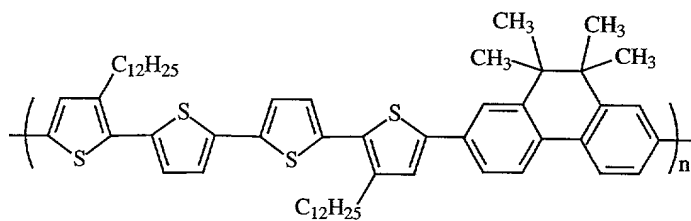
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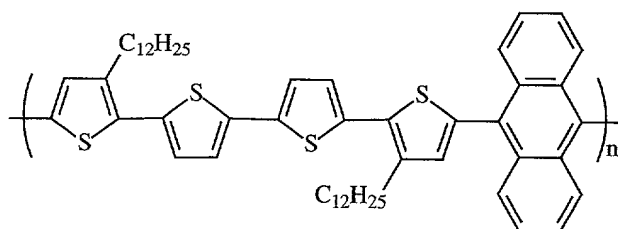
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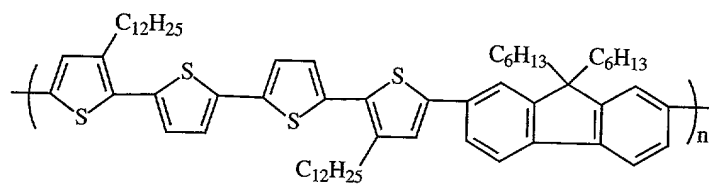
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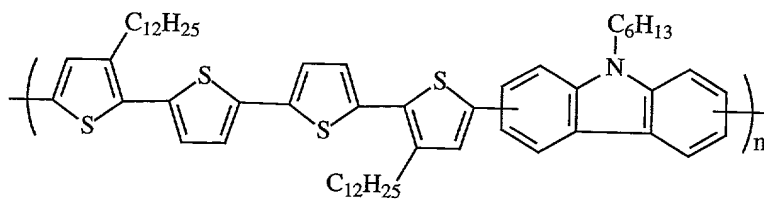
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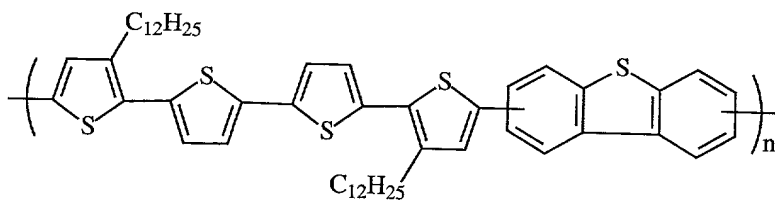
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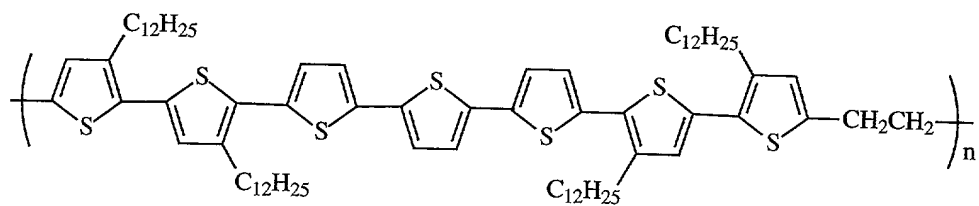
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(11)



(12)

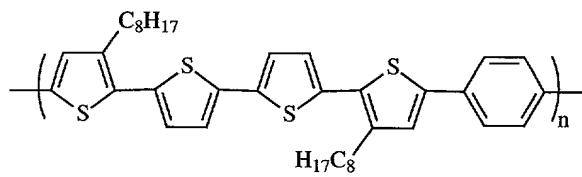


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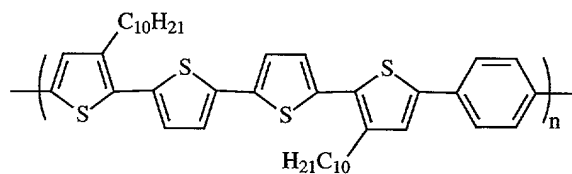
\*c1cc(C12H25)sc1-c1ccsc1-c1ccsc1-c1cc(C12H25)sc1-c1ccc(cc1)-C(C)(C)c2ccc(cc2)\*
$$\left( \text{C}_{12}\text{H}_{25} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_4\text{H}_2\text{S} \text{---} \text{C}_{12}\text{H}_{25} \text{---} \text{SCH}_2\text{CH}_2\text{S} \right)_n$$
$$\left( \text{C}_6\text{H}_4 - \text{S} - \text{C}_6\text{H}_4(\text{C}_{12}\text{H}_{25})_2 - \text{S} - \text{C}_6\text{H}_4 - \text{S} - \text{C}_6\text{H}_4(\text{C}_{12}\text{H}_{25})_2 - \text{S} - \text{C}_6\text{H}_4 - \text{S} - \text{C}_6\text{H}_4(\text{C}_{12}\text{H}_{25})_2 - \text{S} - \text{C}_6\text{H}_4 - \text{C}(\text{CH}_3)_2 - \text{C}_6\text{H}_4 \right)_n$$

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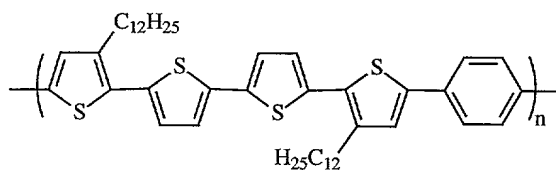
29. A thin film transistor device in accordance with **claim 16** wherein polythiophene (III) is alternatively wherein n represents the number of segments



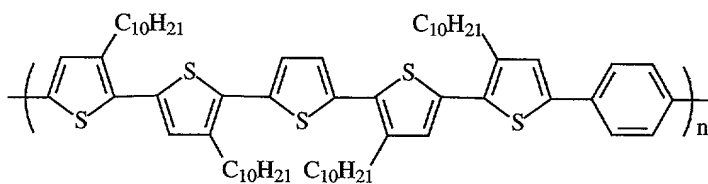
(1)



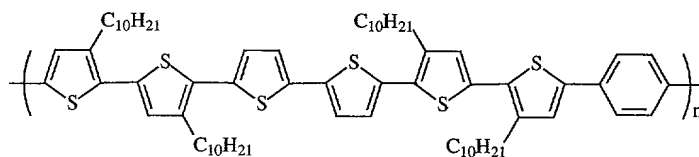
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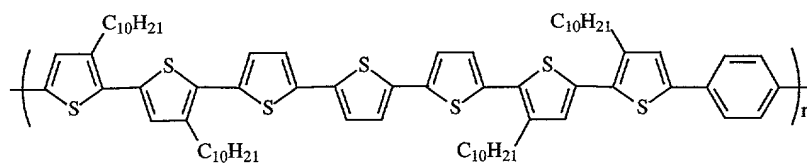
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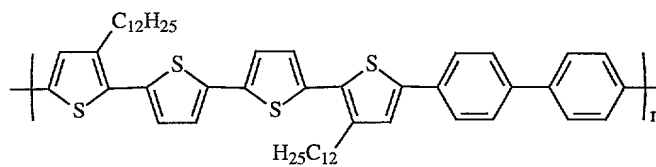
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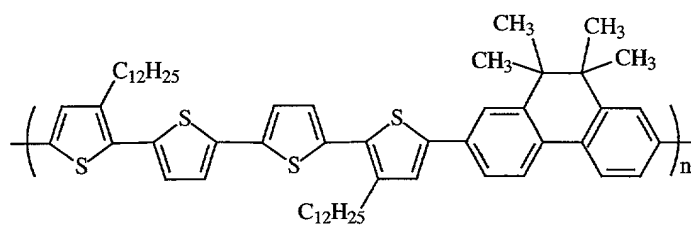
(5)



(6)

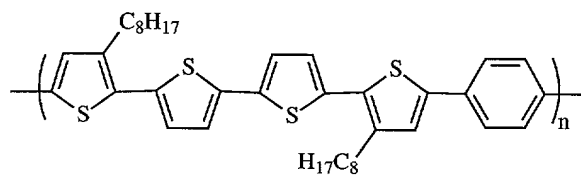


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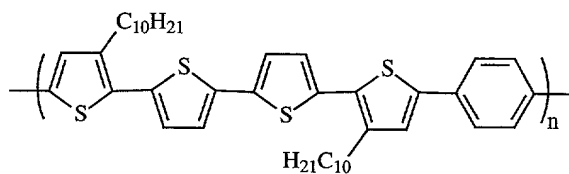


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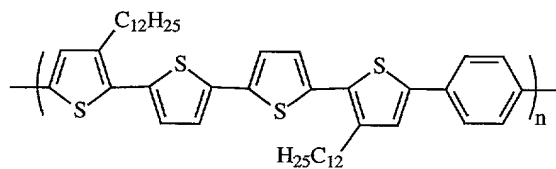
30. A thin film transistor device in accordance with **claim 16** wherein polythiophene (III) is alternatively wherein n represents the number of segments



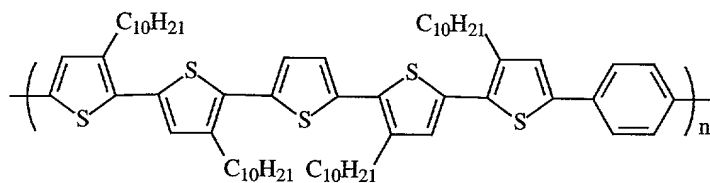
(1)



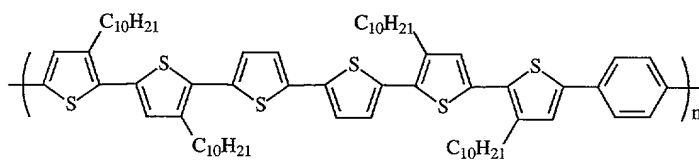
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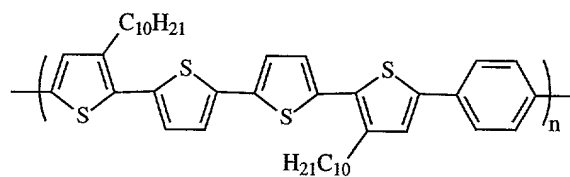


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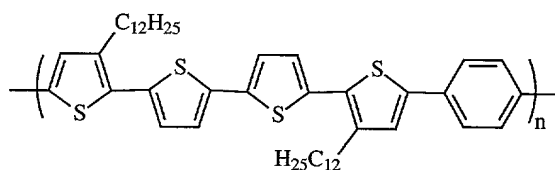


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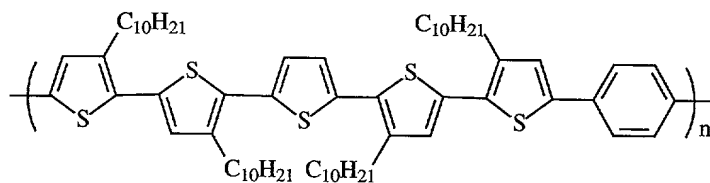
31. A thin film transistor device in accordance with **claim 16**  
 wherein said polythiophene is alternatively



(2)



(3)



(4)



32. A thin film transistor device in accordance with **claim 16** wherein said substrate is a plastic sheet of a polyester, a polycarbonate, or a polyimide; said gate, source, and drain electrodes are each independently comprised of gold, nickel, aluminum, platinum, or indium titanium oxide; and said gate dielectric layer is comprised of silicon nitride, silicon oxide, insulating polymers of polyester, polycarbonates, polyacrylate, poly(methacrylate), poly(vinyl phenol), polystyrene, polyimide, or an epoxy resin.

33. A thin film transistor device in accordance with **claim 17** wherein said substrate is glass or a plastic sheet; said gate, source and drain electrodes are each independently comprised of gold or a metal dispersion in a binder; said gate dielectric layer is comprised of an organic polymer of polyester, polycarbonate, polyacrylate, poly(methacrylate), poly(vinyl phenol), polystyrene, polyimide, or an epoxy resin, or an inorganic-organic composite of nanosized metal oxide particles dispersed in a polymer of a polyester, a polyimide, or an epoxy resin.

34. A thin film transistor device in accordance with **claim 16** wherein the thickness of the substrate is from about 10 micrometers to about 10 millimeters; the thickness of the gate dielectric layer is from about 10 nanometers to about 1 micrometer; the thickness of the polythiophene semiconductor layer is from about 10 nanometers to about 1 micrometer; the thickness of the gate electrode layer is from about 10 nanometers to about 10 micrometers; and the thickness of the source or drain electrode is from about 40 nanometers to about 1 micrometer.